





UN BASIC SPACE SCIENCE INITIATIVE

BSS (1991-2004) IHY2007 (2005-2009) ISWI (2010-2012)

Hans J. Haubold

UN, COPUOS, OOSA
UN International Programme on Space Applications
UN-affiliated Regional Centres for Space Science and Technology Education

Information Dissemination
International and Regional Cooperation
Telescopes, Planetariums
Instrument Arrays
Array of Arrays
ADS and VO
Astronomy, Physics, Mathematics









UN Information Dissemination

- 178 UN Development Programme (UNDP) Offices
- 185 Permanent Missions of 192 UN Member States



North America: NASA

Europe: ESA

Japan: JAXA

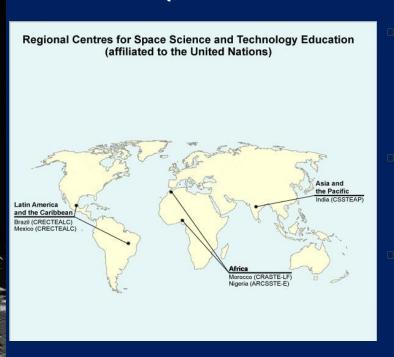
ECA, ESCAP, ECLAC, (ESCWA)







Regional Centres for Space Science and Technology Education (affiliated to the UN)



- The Regional Centres for Space Science and Technology Education were created under the auspices of the United Nations
- Goal: to develop, through in-depth education, an indigenous capability for research and applications in the core disciplines of:
 - Remote Sensing & GIS
 - **Satellite Communications**
 - Satellite Meteorology and Global Climate
 - Space and Atmospheric Sciences

Regional Centres located in:

- Africa: CRASTE-LF (Morocco), CSSTE-E (Nigeria)
- Asia and the Pacific: CSSTEAP (India)
- Latin America and the Caribbean: CRECTEALC (Brazil/Mexico)



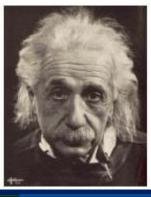


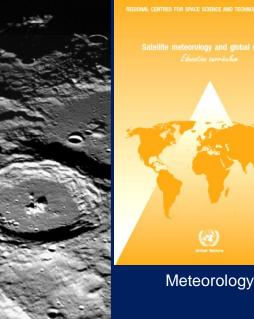


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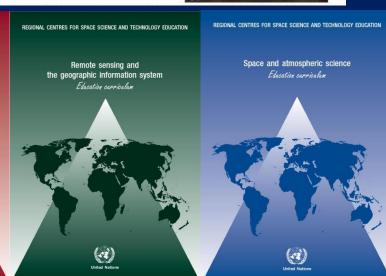


$$\mathrm{d}s^z = -igg(1+rac{2oldsymbol{\Phi}}{c^z}igg)ig(c\ \mathrm{d}t'ig)^z + igg(1-rac{2oldsymbol{\Phi}}{c^z}igg)ig(\mathrm{d}x^z+\mathrm{d}y^z+\mathrm{d}z^zig)$$









Communications

Remote Sensing

Space Science

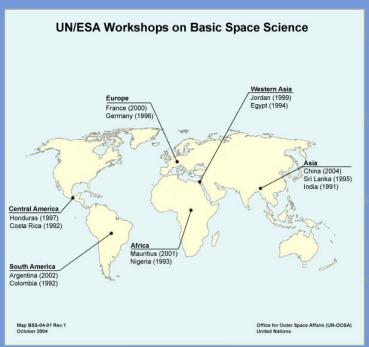
Future: GNSS, Space Law







Workshops BSS: Planetariums and Telescopes





Regional:

India, Costa Rica, Colombia, Nigeria, Egypt

Inauguration of optical telescopes: Sri Lanka, Honduras, Jordan

International:

Germany, France, Mauritius, Argentina

Review of all workshops:

P.R. China



Government of Japan: Telescopes (7) and Planetariums (21)









Final Report BSS

Fansteker xpr 11-11-2003 13:15 Pagina 1

Developing Basic Space Science World-Wide

A Decade of UN/ESA Workshops

Willem Wamsteker, Rudolf Albrecht and Hans J. Haubold (Eds.)

When the first United Nations/European Space Agency Workshop for Basic Space Science was planned to be held in Bangalore, India (1991) on the invitation of ISRO, few of those involved could expect that a unique forum was agoing to be orated for scientific dialogue between scientists from developing and industrialized nations. As the format of the first workshop was on purpose left fire with time for presentations, working sessions, and plenary discussions, book brings together the historical activities, the plans which have been developed over the past decade in the different developing nations. It aims to achieve for development agencies to be assisted in ways to find more effective tools for the application of development and. The last section of the book contains a guide for teachers to introduce astrophysics into university physics courses. This will be of use for teachers in many nations.

Everything desorbed in this book is the "result of a truly collective effort from all involved in all UNIESA workshops. The mutual support from the participants has helped significantly to implement some of the accomplishments described in the book. Rather than organizing this book in a subject driven way, it is essentially organized according to the common economic regions of the world, as defined by the United Nations (Africa, Asia and the Pacific, Europe, Laifn Arica and the Capibbean, Western Asia). This allows better recognition of the importance of a regional (and at times) global approach to basic space science for the developing nation's world wide. It highlights very specific scientific investigations which have been completed successfully in the various developing nations. The book supplements the published ten volumes of workshop proceedings containing scientific paper presented in the workshops from 1961 to 2002.

Information on the workshops is also available at http://www.seas.columbia.edu/~ah297/un-esa/index.html http://www.oosa.unvienna.org/SAP/bss/index.html

WWW.WKAP.NL KLUWER ACADEMIC PUBLISHERS

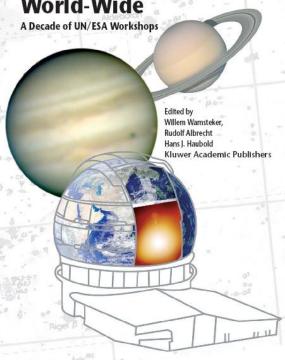


Developing Basic Space Science World-Wide

Willem Wams
Rudolf Albrec



Developing Basic Space Science World-Wide









Workshops IHY2007: Instruments

1st 2005 UAE

providers:

Japan, USA, France, Armenia, Brazil, Switzerland

Instrument hosts:

> 90 countries

2nd 2006 India

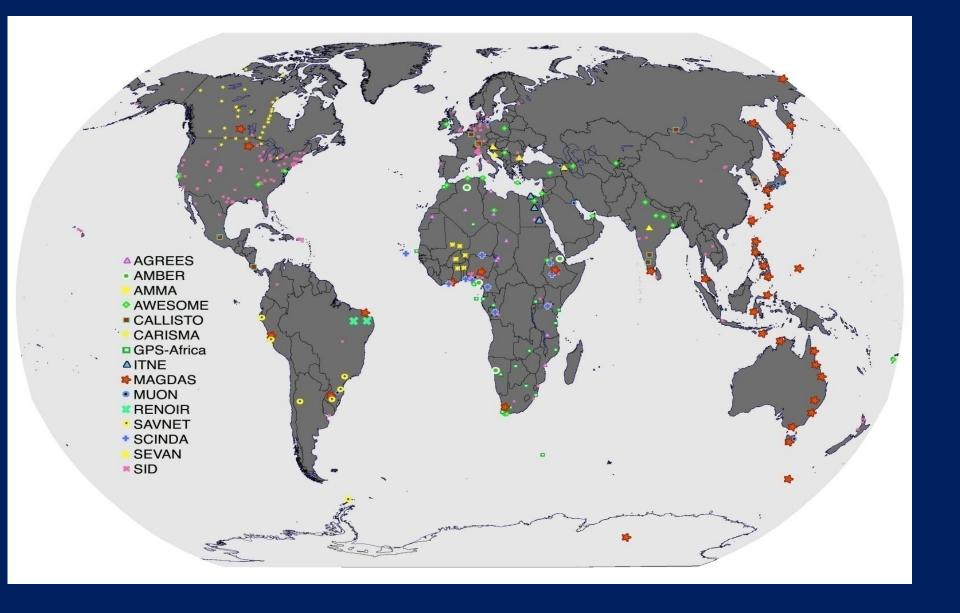
3rd 2007 Japan

4th 2008 Bulgaria

5th 2009 Republic of Korea







This model for developing instrument networks was proven during the IHY





Final Report IHY

Studies in Space Policy

B. J. Thompson · N. Gopalswamy J. M. Davila · H. J. Haubold Editors Putting the "I" in IHY The United Nations Report for the International Heliophysical Year 2007 Studies in Space Policy, Vol. 3

This book about the international aspects and achievements of the "International Heliophysical Year (IHY) 2007" can be regarded as a compendium of the fertile impacts of conducting research in this field. The main focus; as the title implicates, is the international cooperation, which has emerged from this grassroots Initiative. North and South, industrialized and developing countries have been coordinating their efforts and have been learning from each other in a mutual partnership under a joint understanding of sharing the scientific benefits. Through this, trans-border networks have been created and scientific as well as cultural

Another focus of the book shows, how much astronomy contributes to the basis of knowledge society as today's concept for mastering the future. Heliophysics has been and will be attracting large numbers of young people to enter an education and career in science and engineering. Such attractions we desperately need in all countries around the world, and we have to be glad about initiatives like (HY, which are successful in raising awareness, interest and fascination.

ISBN 978-3-211-99179-4











Thompson et al. Eds



Putting the "I" in IHY

Studies in Space Policy

B. J. Thompson N. Gopalswamy J. M. Davila H.J. Haubold **Editors**



The United Nations Report for the International Heliophysical Year 2007

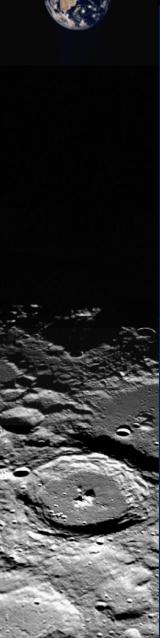




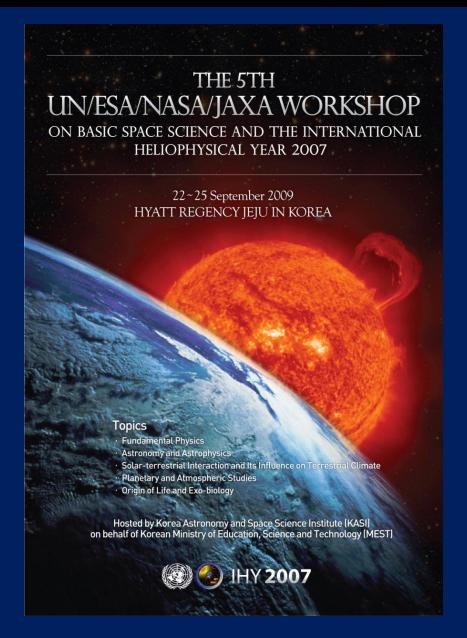






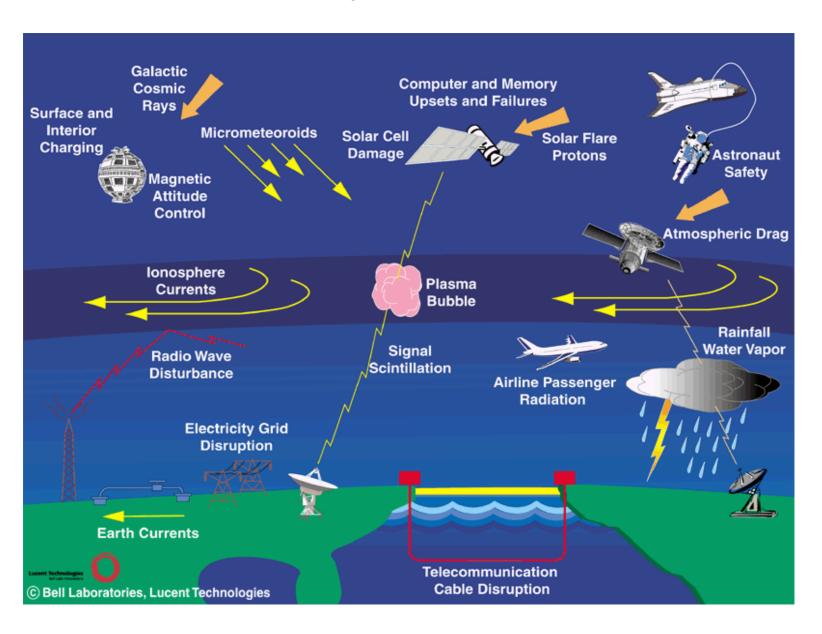








Space Weather



Information Dissemination

ISWI Newsletter <u>ISWInewsletter-on@mail-list.com</u>

Space Environment Research Centre, Kyushu University, Japan

ISWI Website http://www.iswi-secretariat.org

 Solar Terrestrial Influences Laboratory, Bulgarian Academy of Sciences, Bulgaria

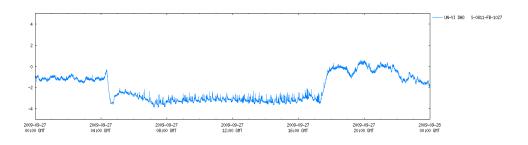


Instrument Programme

Sudden Ionospheric Disturbance Monitor (SID) operated by UNOOSA







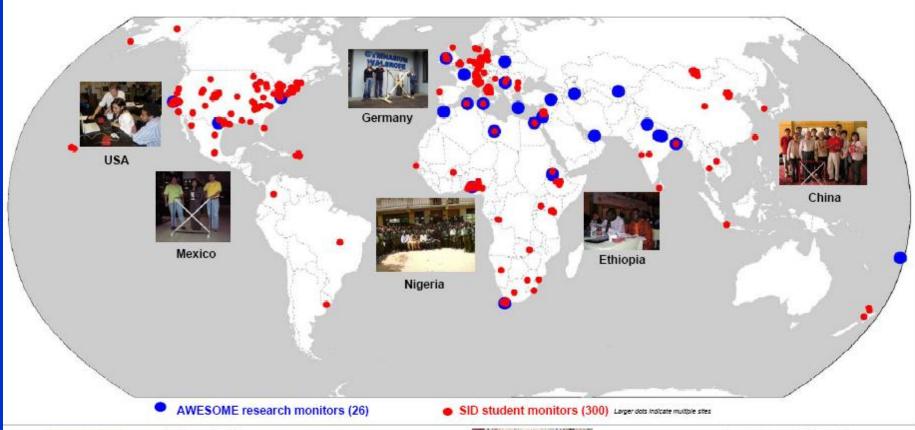


Space Weather Monitor Sites 🐫





IHY Distribution 2007-2009









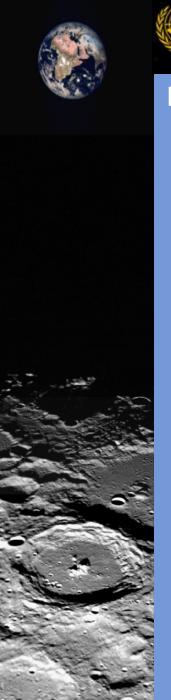
Romania



Lebanon

Thailand









BSS TRIPOD: Telescope, Observing, Teaching

Government of Japan (NAOJ):

Japanese Cultural Grant Aid
45cm reflecting telescope
CCD & computer equipment
Building/ dome/ maintenance provided
by local institution
Singapore 1987, Indonesia 1988,
Thailand 1989, Sri Lanka 1995,
Paraguay 1999, The Philippines 2000,
Chile 2001, Mongolia 2008, India?

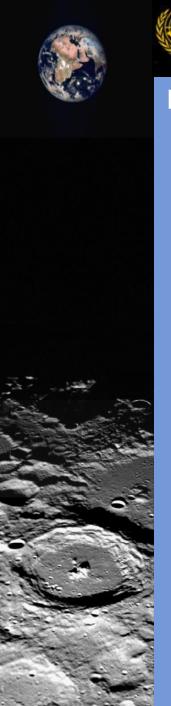


Sri Lanka 1996

American Association of Variable Star Observers (AAVSO):

Hands-on Astrophysics
Setting Up a Variable Star Observing
Programme
Astronomy, mathematics, computer
science







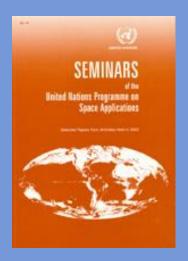


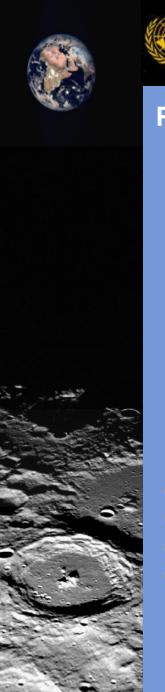
BSS TRIPOD: Telescope, Observing, Teaching

International Astronomical Union (IAU):

Astrophysics for University Physics Courses

- Study/ comparison of university education curricula in developing countries
- Elementary calculus
- Classical mechanics
- Statistical mechanics
- Thermodynamics applied to astronomy
- Advanced teaching material recommended: K.R. LANG / J. BENNET et al.







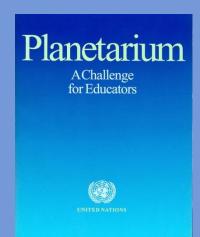


PLANETARIUMS



Government of Japan (NAOJ)
Host country
UNOOSA

Myanmar, Jordan, Malaysia, The Philippines, India, Argentina, Uruguay, Vietnam, Thailand, Sri Lanka, India, Uzbekistan, Paraguay, Ecuador, Honduras, Costa Rica, Peru, Bolivia, Cuba, El Salvador (2007)





Viet Nam 1998

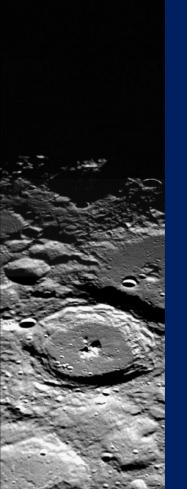






IHY TRIPOD: Instrument Array, Data, Teaching

- Since 2005, deploying small inexpensive instruments such as magnetometers, radio antennas, GPS receivers, particle detectors around the world to make global measurements of ionospheric, magnetospheric, and heliospheric phenomena
- Partnership between instrument providers and instrument host nations.
 - Provision of instrumentation by PI
 Host institution makes available manpower, facilities,
 and operational support
- Data taking, sharing, analysis, publication
- Teaching space science at university level utilizing data











Centre for Mathematical Sciences (CMS) Pala, Kerala, India

1995, 2000, 2005- 2009, 2010 six-week SERC Schools on Special Functions and Functions of Matrix Argument: Recent advances and applications in stochastic processes, statistics, wavelet analysis and astrophysics

Lecture Notes available on request from cmspala@gmail.com or downloadabe at www.cmsintl.org

2010 SERC School on Matrix Variable Calculus and Statistical Distribution Theory and Applications in Data Analysis, Model Building and Astrophysics Problems

12 April – 14 May 2010





CMS: Special Functions









Non-extensive Statistical Mechanics

Generalizing Boltzmann-Gibbs statistical mechanics





B.G. Statistics - A reminder.

• Entropy:

$$S = -k \sum_{i} \rho_{i} \ln \rho_{i}$$

Constraints:

$$\begin{cases} 1 = \sum_{i} \rho_{i} \\ U = \sum_{i} \rho_{i} \epsilon_{i} \end{cases}$$



• Maximize the objective:

$$J = -k \sum \rho_i \ln \rho_i + \sum \rho_i + \beta \sum \rho_i \epsilon$$

$$\frac{\partial J}{\partial \rho} = 0$$

$$J = -k \sum_{i} \rho_{i} \ln \rho_{i} + \sum_{i} \rho_{i} + \beta \sum_{i} \rho_{i} \epsilon_{i}$$
• Yields distribution:
$$\rho_{i} = e^{-\beta \epsilon_{i}} / Z \quad \text{where } Z = \sum_{i} e^{-\beta \epsilon_{i}}$$

Postulate: [C. Tsallis J. Stat. Phys. 52 p479 (1988)]

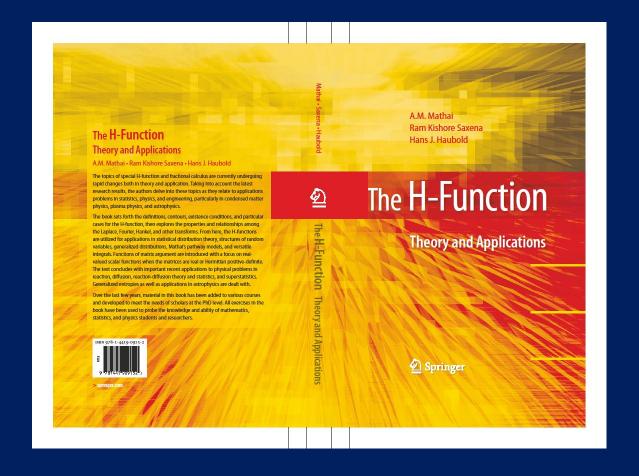
Generalized entropy:

$$S_{q} = k \frac{1 - \sum_{i} \rho_{i}^{q}}{q - 1} \qquad q \in \Re$$

where q characterizes the extensivity of the statistics. Note: For q=1 regular B.G. Statistics is recovered:

$$S_{q\to l} \to -k \sum_{i} \rho_i \ln \rho_i$$

CMS: H-Function









Solar Wind: Magnetic Field Strength

SOLAR WIND: Magnetic Field Strength

L.F. Burlaga and A. F.-Vinas (2005) / NASA Goddard Space Flight Center

[Data: Voyager 1 spacecraft (1989 and 2002); 40 and 85 AU; daily averages]

